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Psychological effects of the COVID-19 pandemic on healthcare professionals

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Abstract
Aim: In this study, we aimed to investigate anxiety, depression, and sleep problems in healthcare professionals during the pandemic.
Material and Methods: This descriptive and cross-sectional study was conducted with the staff of Diyarbakır Gazi Yaşargil Training and Research Hospital. A total of 170 people were reached for the research. The data collected by the on-line survey method consisted of demographic questions, questions about behavior change due to COVID-19, Generalized Anxiety Disorder Scale (GAD-7), Patient Health Questionnaire (PHQ-9), and Insomnia Severity Index (ISI).
Results: It was found that 72.9% of the healthcare professionals had anxiety, 83.5% had depression, and 87.1% had sleep problems. The total score of the GAD-7 scale was found to be significantly higher in those who used personal protective equipment (p=0.021) and those who received infection training (p<0.001). The PHQ-9 scale total score was higher in those 35 years of age and older (p=0.019) and college graduates (p=0.023). The total score of the insomnia severity scale (ISI) was significantly higher in individuals aged 35 years and older (p=0.040), in college graduates (p=0.049), and single/divorced (p=0.009). A significant difference was found between gender, occupation, smoking, fear of infection, burnout status, and total scores on all three scales (p<0.05).
Discussion: Healthcare professionals were found to have high levels of anxiety, depression, and sleep problems. Anxiety, depression, and insomnia problems were higher in women, health technicians, smokers, those with fear of infection, and those with burnout.

Keywords
Anxiety, Coronavirus, Burnout, Depression, Insomnia

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Introduction

The COVID-19 (coronavirus disease 2019) pandemic is a global crisis that causes unprecedented changes in our lives. This infectious disease is a newly recognized coronavirus, SARS-CoV-2-induced respiratory infection [1]. Common symptoms of infection are fever, cough, muscle aches, and dyspnea. In more severe cases, pneumonia, severe acute respiratory tract infection, and even deaths may occur [2].

The COVID-19 pandemic is accompanied by psychiatric symptoms and emotional problems that emerge as fear, anxiety, panic, insecurity, and intense stress, which we can define as 'psychological pandemics'. Healthcare professionals fight the disease on the front lines by risking their lives in all pandemics. Physicians, nurses, and all other assistant health workers working in all health institutions are exposed to the stress of epidemics at the highest level and try to cope with their psychological consequences for a long time [3].

Healthcare professionals face great pressure in the COVID-19 pandemic due to contact with cases, high risk of infection, inadequate protection, lack of experience in disease management. These factors increase the incidence of long-term psychological problems among healthcare professionals, such as fear, anxiety, depression, and insomnia, affecting job efficiency and well-being [4]. It was reported that the rates of insomnia (34% -36%), anxiety (45%), and depressive symptoms (50%) experienced by healthcare professionals during the pandemic were high [5].

In this period, it is vital to understand more comprehensively the psychological burden among healthcare professionals, improve mental health support services, and strengthen mental health services worldwide [6]. This cross-sectional study aimed to investigate the prevalence of psychological problems in different healthcare professionals during the COVID-19 outbreak and determine the effects of demographic characteristics associated with various psychological problems.

Material and Methods

The population of this descriptive and cross-sectional study consisted of staff members of the Health Sciences University Diyarbakır Gazi Yaşargil Training and Research Hospital. The research field study was carried out by online survey method after obtaining permission from the ethics committee (Health Sciences University Diyarbakır Gazi Yaşargil Education and Research Hospital Non-invasive Clinical Research Ethics Committee) and institutional permission. The voluntary basis was taken into consideration in participating in the study, and the participants who did not volunteer to participate in the study were asked not to fill out the questionnaire forms and not take into account the incoming message.

The number of active employees recruited from the hospital staff is 2270 (doctors, nurses, midwives, health officers, physiotherapists, psychologists, dieticians, laborants, health technicians). When the sample size was calculated over 2270 people, it was aimed to reach 187 people while the study's power was 95%, d: 3% error and the expected average in terms of the variable examined was 5%. A message was sent to the whole sample, and a total of 170 people answered the questionnaire (Response rate: 90.9%).

Volunteers aged 18-65 years without any illness (psychosis, dementia, delirium) that would impair mental balance were included in the study. Those who did not want to participate voluntarily and did not comply with these conditions also constituted the exclusion criteria.

Data collection tools

The questionnaire consists of 5 sections: demographic questions, behavioral change questions due to COVID-19, Generalized Anxiety Disorder, The Patient Health Questionnaire, and Insomnia Severity Index. Demographic questions are available in the first part of the questionnaire form. In the second part of the questionnaire, healthcare professionals were asked questions about the perceived behavior change in their hygiene and social habits after COVID-19. The answers to these questions were scored as 'I don't know =0 points', 'unchanged=1 point', 'slightly changed=2 points', 'moderately changed=3 points', and 'too much changed=4 points'. The scores ranged from 0 to 28. The relevant scales were also used in the rest of the questionnaire.

Generalized Anxiety Disorder-7 (GAD-7) Test

The Generalized Anxiety Disorder Assessment (GAD-7) is a seven-item instrument. The scale was developed by Spitzer et al. according to DSM IV-TR criteria to evaluate generalized anxiety disorder [7]. Konkan et al. conducted Turkish validity and reliability studies of the scale [8]. Likert-type scale (0=none, 1=many days, 2= more than half of the days, 3=almost every day) was ranked on the 4-level ordinal scale. The scores that can be obtained from the scale are between 0 and 21. The total scores obtained from the scale are the cut-off points for mild, moderate, and severe anxiety as 5, 10, and 15, respectively.

Patient Health Questionnaire-9

The PHQ-9 is a questionnaire prepared for screening depression in administered individuals. This questionnaire consists of a total of nine items questioning the diagnosis of depressive disorder. The scale was developed by Spitzer et al. [9]. Validity and reliability studies in Turkish were conducted by Sarı et al. [10]. Answers are scored as "None", "A few days", "More than a week," and "Almost every day", with a minimum score of 0 and a maximum score of 3. Scores 1-4 mean no depression, 5-9 mean mild depression, 10-14 mean moderate depression, 15-19 mean partially severe depression, and 20-27 mean severe depression.

Insomnia Severity Index

This scale, which has been found to be valid and reliable tool in Turkish by Boysan M et al. [11], was developed by Morin et al. [12]. This scale is a measurement tool with proven validity and reliability and has practical use in assessing insomnia. It consists of seven questions, and a score of 0-4 is given for each item. The maximum score that can be obtained on the scale is 28. The results are evaluated as clinically insignificant insomnia between 0-7 points, insomnia between 8-14 points, clinical insomnia between 15-21 points, moderate severity between 22-28 points, severe clinical insomnia.

Statistical Analysis

SPSS 22.0 statistical package program was used in the analysis of the data. Descriptive values were indicated by number, percentage, and mean ± standard deviation. Normality analysis of the measuring data was performed using the Kolmogorov-

Smirnov test. Student t-test was used to compare the binary groups in the data that fit the normal distribution, and the one-way ANOVA test was used to compare more than two groups. Post-hoc analysis was performed to find out where the difference originated in the triple groups. Multiple regression analysis was performed to compare quantitative data, and $p<0.05$ was accepted as statistical significance in all analyzes.

Results

Females accounted for 54.7% of the healthcare professionals, 84.7% were university graduates, and 51.8% were married; 48.2% of the participants were nurses/midwives/health officers, 25.3% were physiotherapists/dieticians/psychologists/ laborants, 17.1% were doctors, and 9.4% were health technicians. While 68.8% of the employees were non-smokers,, 95.9% have not received any psychiatric treatment so far. While 74.1% of healthcare professionals experienced fear of becoming infected due to the disease, 80% experienced burnout in this process (Table 1). The mean age of the employees was 31.51±6.60 (min=22, max=64) years.

Anxiety (GAD-7≥5) was detected in 72.9% of the employees, depression (PHQ-9≥5) in 83.5%, and sleep problems (ISI≥8) in 87.1% of the employees (Figure 1).

The total score of the GAD-7 scale was found to be significantly higher in those who used personal protective equipment ($p=0.021$) and those who received infection training ($p<0.001$). The PHQ-9 scale total score was higher in those aged 35 years and older ($p=0.019$) and college graduates ($p=0.023$). The total score of the ISI scale was significantly higher in those aged 35 years and older ($p=0.040$), in college graduates ($p=0.049$), and single/divorced ($p=0.009$). A significant difference was found between gender, occupation, smoking, fear of infection, and burnout status and the total scores on all three scales ($p<0.05$) (Table 2).

A low level of significant correlation was found in the multiple regression model between anxiety and gender, occupation, smoking, fear of infection, receiving infection training, and burnout ($R2=0.22$, $p<0.001$). These variables explain 22% of the total variance for anxiety, and the order of importance of the variables was determined as burnout, receiving infection training, occupation, and fear of being infected.

A low level of significant correlation was found between depression and age, gender, education, occupation, smoking, fear of infection, receiving infection training, and burnout ($R2=0.21$, $p<0.001$). These variables explain 21% of the total variance for depression, and the order of importance of the variables was determined as burnout, smoking, fear of infection, gender, and receiving infection training.

A low level of significant relationship was found between insomnia and age, gender, education, occupation, smoking, fear of infection, receiving infection training, and burnout ($R2=0.20$, $p<0.001$). These variables explain 20% of the total variance for depression, and the order of importance of the variables was determined as fear of infection, gender, burnout, and smoking (Table 3).

The responses of healthcare professionals to behavioral questions related to COVID-19 are shown in Figure 2. The behavior of healthcare professionals regarding avoiding

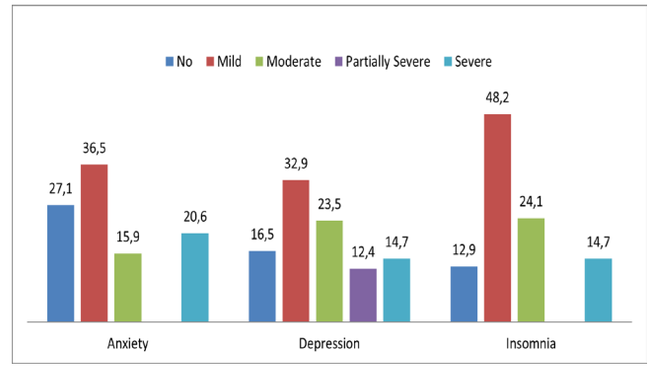

Figure 1. Distribution of Participants According to Anxiety, Depression, and Insomnia

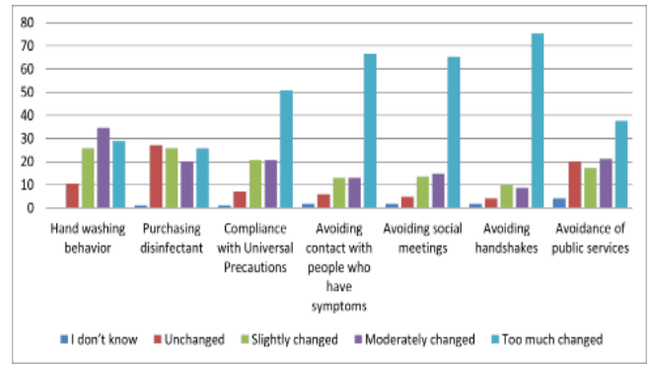

Figure 2. COVID-19 Behavior Questions for Employees

Table 1. Sociodemographic Characteristics of Participants

		n (170)	%
Age	35 years and under	135	79.4
	Over 35 years old	35	20.6
Gender	Female	93	54.7
	Male	77	45.3
Education	High school	9	5.3
	College	17	10.0
	University	144	84.7
Marital status	Married	88	51.8
	Single / Divorced / Widow	82	48.2
Occupation	Doctor	29	17.1
	Nurse/Midwife/Health Officer	82	48.2
	Physiotherapist/ Dietician/ Psychologist/ Laborant	43	25.3
	Health Technician	16	9.5
Smoking	Yes	53	31.2
	No	117	68.8
Psychiatric Treatment	Yes	7	4.1
	No	163	95.9
Fear of Infection	Yes	126	74.1
	No	44	25.9
Personal Protective Use	Yes	134	78.8
	No	36	21.2
Getting infectious diseases training	Yes	84	49.4
	No	86	50.6
Burnout	Yes	136	80.0
	No	34	20.0

Table 2. Change in Mean Scale Scores According to Sociodemographic Characteristics

		GAD-7		PHQ-9		ISI	
		Mean±SD†	Test	Mean±SD†	Test	Mean±SD†	Test
Age*	35 years and under	8,87±5,95	t=1,59	11,51±6,81	t=2,42	14,40±6,32	t=2,10
	Over 35 years old	7,02±6,13	p=0,117	8,48±6,54	p=0,019	11,88±6,30	p=0,040
Gender	Male	7,31±5,84	t=-2,36	9,40±6,56	t=-2,63	12,46±6,71	t=-2,65
	Female	9,47±6,01	p=0,019	12,12±6,86	p=0,009	15,06±5,86	p=0,009
Education**	High school	8,22±6,62	F=2,34	13,11±7,99	F=3,85		F=3,08
	College	11,47±7,05		14,76±7,22a		17,47±5,73[a]	
	University	8,15±5,79	p=0,099	10,29±6,60a	p=0,023	13,45±6,45[a]	p=0,049
	Married	8,09±5,26		9,93±5,40		12,64±5,69	
Occupation**	Doctor	5,72±5,11[a,b]	F=6,55	7,37±4,35a,b	F=8,02	11,44±5,65[a,b]	F=10,67
	Nurse/Midwife/H. Officer	9,74±6,69[a,c]		12,87±7,42a,c		15,93±6,27[a,c]	
	PT/RD/Lab#	6,76±3,84[c,d]	p<0,001	8,58±5,32c	p<0,001	10,58±4,61[c,d]	p<0,001
	Health Technician	11,75±5,73[b,d]		13,31±7,00b		16,68±7,27[b,d]	
Smoking*	Yes	10,26±6,66	t=2,45	13,35±7,34	t=3,06	15,69±6,94	t=2,38
	No	7,69±5,54		9,77±6,33		13,06±5,96	
	No	8,42±5,94	p=0,016	10,95±6,79	p=0,003	13,77±6,36	p=0,019
Fear of Infection*	Yes	9,25±6,12	t=3,07	11,92±6,77	t=3,54	14,88±6,33	t=3,77
	No	6,31±5,19	p=0,003	7,95±6,25	p=0,001	11,02±5,66	p<0,001
Personal Protective Use* Use*	Yes	7,94±5,96	t=-2,37	10,27±6,45	t=-2,05	13,42±6,30	t=-1,80
	No	10,55±5,84		13,19±7,82		15,61±6,47	
	No	10,06±5,72	p=0,021	12,68±6,77	p=0,045	14,75±6,63	p=0,076
	No	4,91±4,11		6,38±4,75		10,11±4,02	

*Student t-test, **One-Way ANOVA test, a,b The group from which the difference originated, † mean ± standard deviation, # Physiotherapist/ Dietician/ Psychologist/ Laborant

Table 3. Relationship between Anxiety, Depression, and Insomnia Scores in Healthcare Professionals and Some Variables

	Variables	b	βeta	t	p	
Anxiety	(Constant)	0,875	-	5.464	<0,001	
	Gender	0,077	0,121	1.694	0,092	
	Occupation	0,051	0,147	2.102	0,037	R2=0,228
	Smoking	-0,069	-0,1	-1.409	0,161	F=8,036
	Fear of Infection	-0,101	-0,14	-1.995	0,048	p<0,001
	Receiving infection training	0,141	0,223	3.150	0,002	
	Burnout	-0,178	-0,225	-3.15	0,002	
Depression	(Constant)	1.311	-	5.269	<0,001	
	Age	0,003	0,062	0,784	0,434	
	Gender	0,099	0,159	2.146	0,033	
	Education	-0,053	-0,089	-1.216	0,226	R2=0,212
	Occupation	0,008	0,024	0,333	0,739	F=5,417
	Smoking	-0,116	-0,173	-2.377	0,019	p<0,001
	Fear of Infection	-0,115	-0,163	-2.283	0,024	
	Receiving infection training	0,099	0,159	2.134	0,034	
	Burnout	-0,182	-0,234	-3.155	0,002	
Insomnia	(Constant)	1.493	-	7.678	<0,001	
	Age	-0,002	-0,042	-0,532	0,596	
	Gender	0,099	0,204	2.741	0,007	
	Education	-0,034	-0,073	-0,999	0,319	R2=0,201
	Occupation	0,002	0,007	0,1	0,921	F=5,068
	Smoking	-0,079	-0,153	-2.079	0,039	p<0,001
	Fear of Infection	-0,119	-0,216	-3.004	0,003	
	Receiving infection training	0,017	0,035	0,469	0,64	
	Burnout	-0,105	-0,175	-2.338	0,021	

R2: Explanatory coefficient.

handshakes (75.3%) and avoiding people with symptoms (66.5%) has changed significantly.

Discussion

While the COVID-19 outbreak has become one of the biggest public health problems seen globally in recent years, it has also severely impacted the health communities. Being under the risk of infectious disease, fear, stress, and intense workload of healthcare professionals may negatively affect their work by reducing their concentration. For this reason, it is essential to evaluate the depression, anxiety, and insomnia problems that employees may experience.

In the first study evaluating psychological factors among healthcare professionals in Turkey, the prevalence of anxiety, depression, and insomnia was 77.6%, 60.2%, and 50.4%, respectively [13]. In a similar study conducted on healthcare professionals in Italy, Rossi et al. reported 8.3% (GAD-7≥15), 24.7% (PHQ-9≥15), and 21.9% (ISI≥22) [14]. In a study evaluating mental health among healthcare professionals in China, it was reported that they found 44.6% (GAD-7≥5) for anxiety, 50.4% (PHQ-9≥5) for depression, and 34.0% (ISI≥8) for insomnia [3]. In our study, the prevalence of anxiety, depression, and insomnia of healthcare professionals was 74%, 83.5%, and 87.1%, respectively. Although the evaluation purposes and the use of the same scale are different, similar results have been obtained in many studies. The values we have found reveal that the situation is getting worse.

Our study found that the relationship between the age variable and depression and insomnia values in healthcare professionals increased significantly. However, age has lost its effect on both depression and insomnia in the multiple regression models. In a study published in China, young (<35 years) healthcare professionals were more likely to develop depressive symptoms and insomnia problems during the COVID-19 outbreak than older participants (≥ 35 years) [15].

In our study, anxiety, depression, and insomnia symptoms were statistically higher in female health workers than in males. Lai et al. demonstrated the effect of gender and stated that women experienced more severe symptoms of depression, anxiety, and insomnia [3]. Zhang et al. found that female gender was one of the most common risk factors for insomnia, anxiety, obsessive-compulsive symptoms, and depression [16]. Biological gender differences, culture, diet, and hormonal changes in women may contribute to higher anxiety, depression, and insomnia rates.

In our study, health technicians' anxiety, depression, and insomnia symptoms were found to be statistically higher than all other employees. In their study, Que et al. reported that technicians had high psychological problems (anxiety, depression, insomnia, and general psychological problems) [17]. In our study, health technicians had high rates in terms of symptoms because technicians are employed in different places. When nurses and doctors who had to work on the front line in our study were evaluated in terms of these symptoms, the nurses had higher rates than doctors. Zhang et al. found that the risk of insomnia increased in nurses and that being a physician was a protective factor against insomnia [18]. This may be related to the fact that nurses with higher disease sensitivity had a higher workload and a higher risk of direct exposure to COVID-19 patients than doctors.

In our study, the anxiety, depression, and insomnia values of smokers were significantly higher than in those who did not smoke. In multiple regression models, smoking was found to affect depression and insomnia symptoms significantly. Que et al. reported that the occurrence of insomnia symptoms in smokers was 1.7 times higher than in non-smokers [17]. Obviously, smoking, as a tool for relaxation, has no effect on solving psychological problems.

In our study, anxiety, depression, and insomnia symptoms of healthcare professionals who feared being infected were statistically higher than those who did not experience this fear. A study conducted in China found that the rate of anxiety development increased 2.3 times in healthcare professionals due to fear of infection [18]. Zhao et al. reported that the risk of exposure to COVID-19 was significantly associated with anxiety, depression, and insomnia in healthcare professionals [19]. In our study, high anxiety and depression in those who stated that their personal protective use was low may also be related to the development of fear of being infected by their patients.

Influential factors in reducing psychological distress during the pandemic process include knowing infectious diseases and implementing infection control rules. In our study, inadequate training on infectious diseases and pandemics, and inadequate knowledge, significantly increased anxiety and depression values. Zhang et al. reported that extreme uncertainty about inadequate education and disease control of infectious diseases resulted in higher depressive and anxiety symptoms scores in their study [18].

Prolonged pandemics are associated with mental health disorders such as anxiety, depression, and burnout. In our study, anxiety, depression, and insomnia were significantly higher in healthcare professionals who stated that they experienced burnout than in those who did not. Burnout was found to have a significant effect on all three scales in the multiple regression models. Tan et al. reported a significant relationship between anxiety and depression scores and higher burnout scores [20]. In their study, Hu et al. reported that approximately half of the nurses with high anxiety levels experienced moderate and high job burnout levels, as shown in emotional exhaustion, depersonalization, and personal success [21]. Increased interaction with patients, accompanying emotional exhaustion intensity, and psychological difficulty may lead to burnout symptoms in employees.

Adherence to the guidelines recommended by the Centers for Disease Control and Prevention (CDC) increases the safety of healthcare professionals. As in the general population, it is critical to comply with the published protection measures and develop appropriate behaviors (available at: https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html). A study conducted in Uganda reported that 74% of healthcare professionals had good practice behaviors against COVID-19 [22]. Our study determined that the behaviors changed in general, and the related measures increased. Healthcare professionals generally exhibit good

practices in attitudes and behaviors in case of disease prevention and infection.

Limitations

This study has some limitations. This was a cross-sectional online survey that did not represent the sample well. Causal relationships should be interpreted carefully. The number of doctors, nurses, and health technicians participating in this survey was limited, limiting the generalizability of the findings. The results were based on self-reported surveys investigating psychological problems.

Conclusion

During the COVID-19 outbreak in Turkey, healthcare professionals experience high anxiety, depression, and insomnia. Female gender, working as a nurse and health technician, smoking, fear of infection, and burnout were identified as significant risk factors for various mental health problems.

Considering past outbreaks, training and psychiatric support of high-risk healthcare professionals during and after the pandemic should be increased to be prepared for current and future events.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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